Devotion School

HIGH PERFORMANCE CHARRETTE

April 2, 2015

HMFH Architects, Inc.

AGENDA

• **Introduction – Project Overview**	10 min
• **Public Comments**	20 min
• **Review of LEED Scorecard**	20 min
• **Focus Areas**	
Energy and Atmosphere Renewable Energy / PV Energy Efficiency Measures Utility Incentives	60 min
Indoor Environmental Quality	30 min
Water Efficiency	15 min
Sustainable Sites	20 min
• **Other Goals**	30 min
• **Next Steps**	5 min

PROJECT OVERVIEW

- **1,044 Students**
- **PK-8th Grade**
- **Approx. 227,000 S.F.**
- **Renovation of 1913 Building, New Construction for rest of the building**
- **Now in Schematic Design Phase**
- **Town Vote in June 2015**
- **Construction Start Summer of 2016**
- **Occupancy in Fall of 2019**

PUBLIC COMMENT

1 DROP-OFF AREA
2 BENCHES
3 URBAN ORCHARD
4 PLAY AREA
5 (5) VISITOR + (1) RESIDENT PARKING
6 DEVOTION HOUSE HERB GARDEN (NIC)
7 FIRE ACCESS/ SPECIAL DROP-OFF
8 ENTRY WITH ACCESSIBLE RAMPS
9 OUTDOOR CLASSROOM
10 BICYCLE PARKING
11 ARRIVAL AREA
12 OUTDOOR CLASSROOM/ COMMUNITY GARDEN/ BUTTERFLY GARDEN
13 GARDEN SHED
14 GREEN ROOF
15 RAIN GARDEN
16 PAVEMENT WITH PLAY MARKINGS
17 UPPER GRADE PLAY AREA
18 TRANSFORMER
19 PRE-K/K PLAY AREA
20 WATER PLAY
21 LOWER GRADE PLAY AREA
22 SLOPED WALK
23 18' WIDE FIRE ACCESS WITH SLIDING GATE AT STEDMAN ST.
24 U-10 SOCCER FIELD, 105' X 140', (ARTIFICIAL TURF)
25 TERRACE SEATING ON SLOPE
26 ACCESSSIBLE RAMP
27 PATH TO STEDMAN
28 (2) BASKETBALL COURTS
EXISTING BUILDING TO REMAIN
EXISTING BUILDING
ENTRY/ EXIT

SCALE: 1" = 40'-0"
0 40 80

N

DEVOTION SCHOOL - SCHEMATIC SITE PLAN

CRJA

MARCH 23 , 2015

LEED V4 SCORECARD

Y	?	N			
1			Credit	Integrative Process	1

15	0	0	Location and Transportation		15
			Credit	LEED for Neighborhood Development Location	15
1			Credit	Sensitive Land Protection	1
2			Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
4			Credit	Access to Quality Transit	4
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

2	7	3	Sustainable Sites		12
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	Environmental Site Assessment	Required
	1		Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space	1
	3		Credit	Rainwater Management	3
1	1		Credit	Heat Island Reduction	2
		1	Credit	Light Pollution Reduction	1
	1		Credit	Site Master Plan	1
1			Credit	Joint Use of Facilities	1

4	3	5	Water Efficiency		12
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
2		5	Credit	Indoor Water Use Reduction	7
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

12	9	#	Energy and Atmosphere		31
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5	1		Credit	Enhanced Commissioning	6
6	4	6	Credit	Optimize Energy Performance	16
1			Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
	3		Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2

2	11	0	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	5		Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	2		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
	2		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1	1		Credit	Construction and Demolition Waste Management	2

9	5	2	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
Y			Prereq	Minimum Acoustic Performance	Required
1		1	Credit	Enhanced Indoor Air Quality Strategies	2
2	1		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
		1	Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
1	2		Credit	Daylight	3
1			Credit	Quality Views	1
	1		Credit	Acoustic Performance	1

2	4	0	Innovation		6
1	4		Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

3	2	0	Regional Priority		4
	1		Credit	Regional Priority: Specific Credit -Indoor Water Use Reduciton	1
	1		Credit	Regional Priority: Specific Credit - Rainwater Managemnt	1
2			Credit	Regional Priority: Specific Credit - High Priority Site	1
1			Credit	Regional Priority: Specific Credit: Optimize Energy	1

50	41	20	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

GOALS

- **What is important to Brookline?**
- **What should be included in the project?**
- **What are the priorities?**
- **Aim to speak about Goals, NOT Measures or Options**
  - **Renewable Energy or Reduce Greenhouse Gas Emissions are Goals**
  - **Photovoltaics is an Option**

HIGH PERFORMANCE GOALS:
ENERGY AND ATMOSPHERE

12	9	#	Energy and Atmosphere		31
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
5	1		Credit	Enhanced Commissioning	6
6	4	6	Credit	Optimize Energy Performance	16
1			Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
	3		Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2

BUILDING ENVELOPE

- **Roof: R 40**
- **Wall: R 16.09**
- **Window: U 0.3**
- **Window area: 28%**

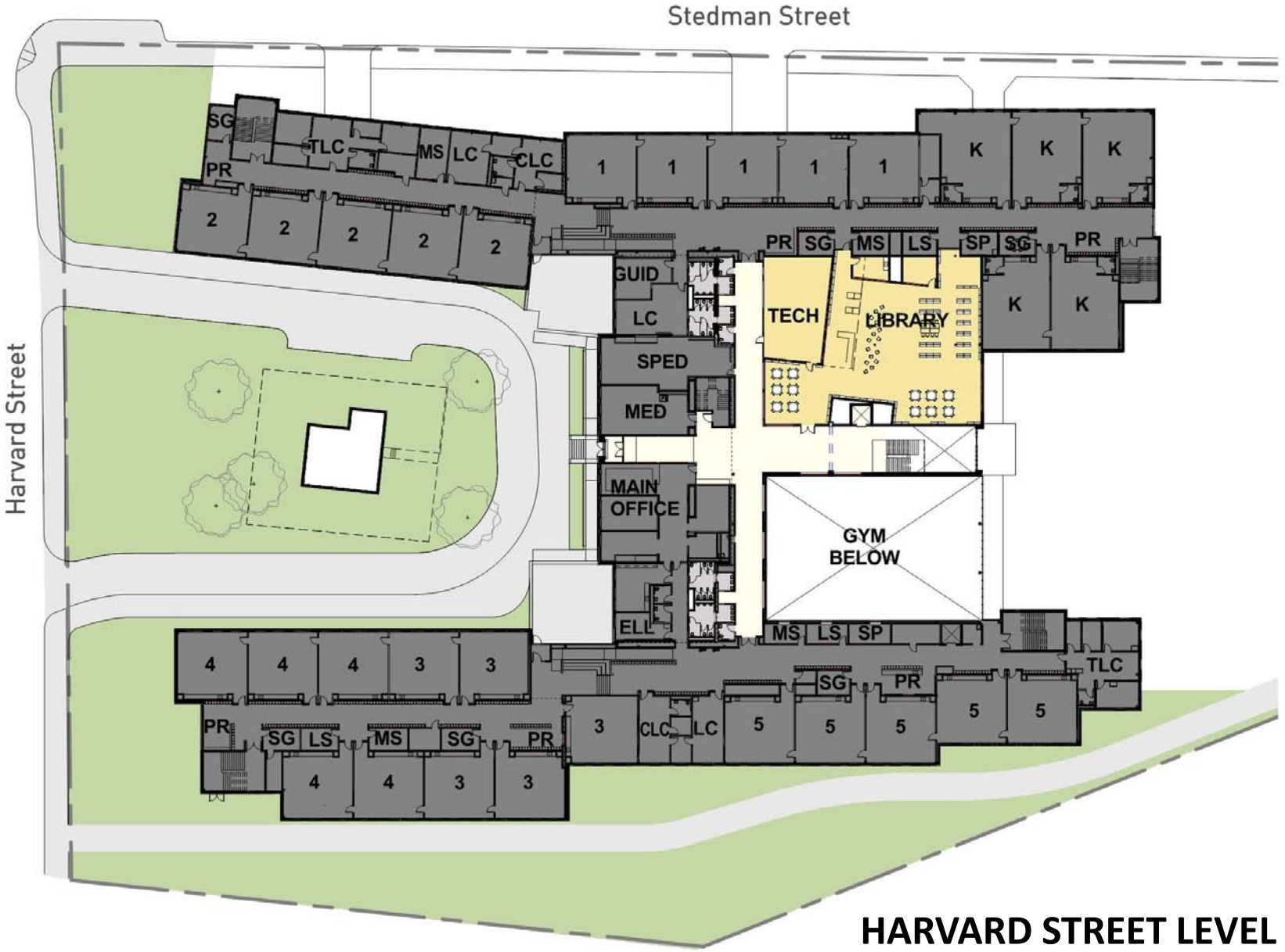
BUILDING USE SCHEDULE

- **Normal School Day**
- **Vacation Weeks**
- **Weekends**
- **Summer Schedule / Summer School?**
- **Times of Partial Occupancy? Use Zones?**

BUILDING USE NORMAL SCHOOL DAY

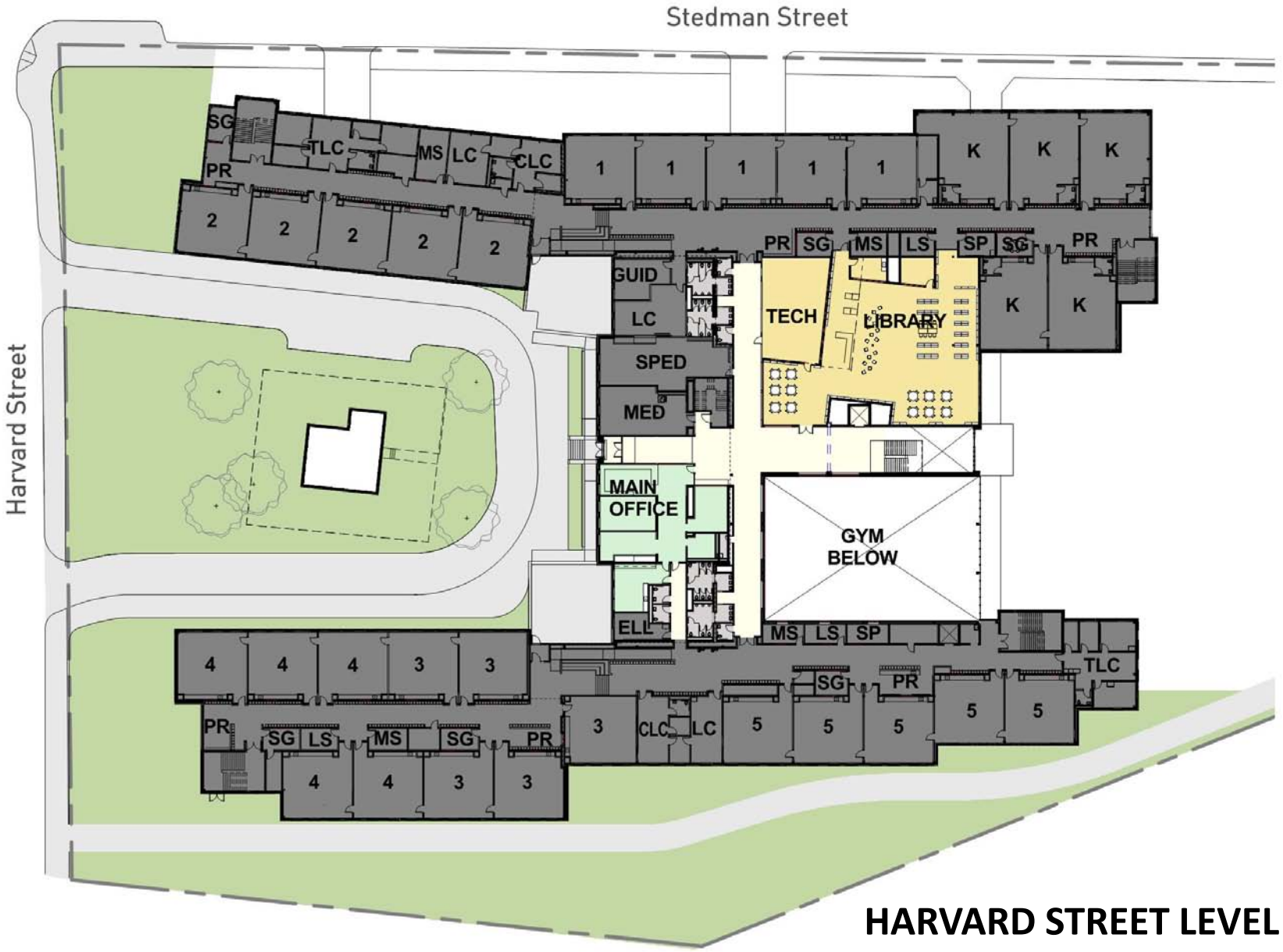
HARVARD STREET LEVEL

BUILDING USE AFTER HOURS

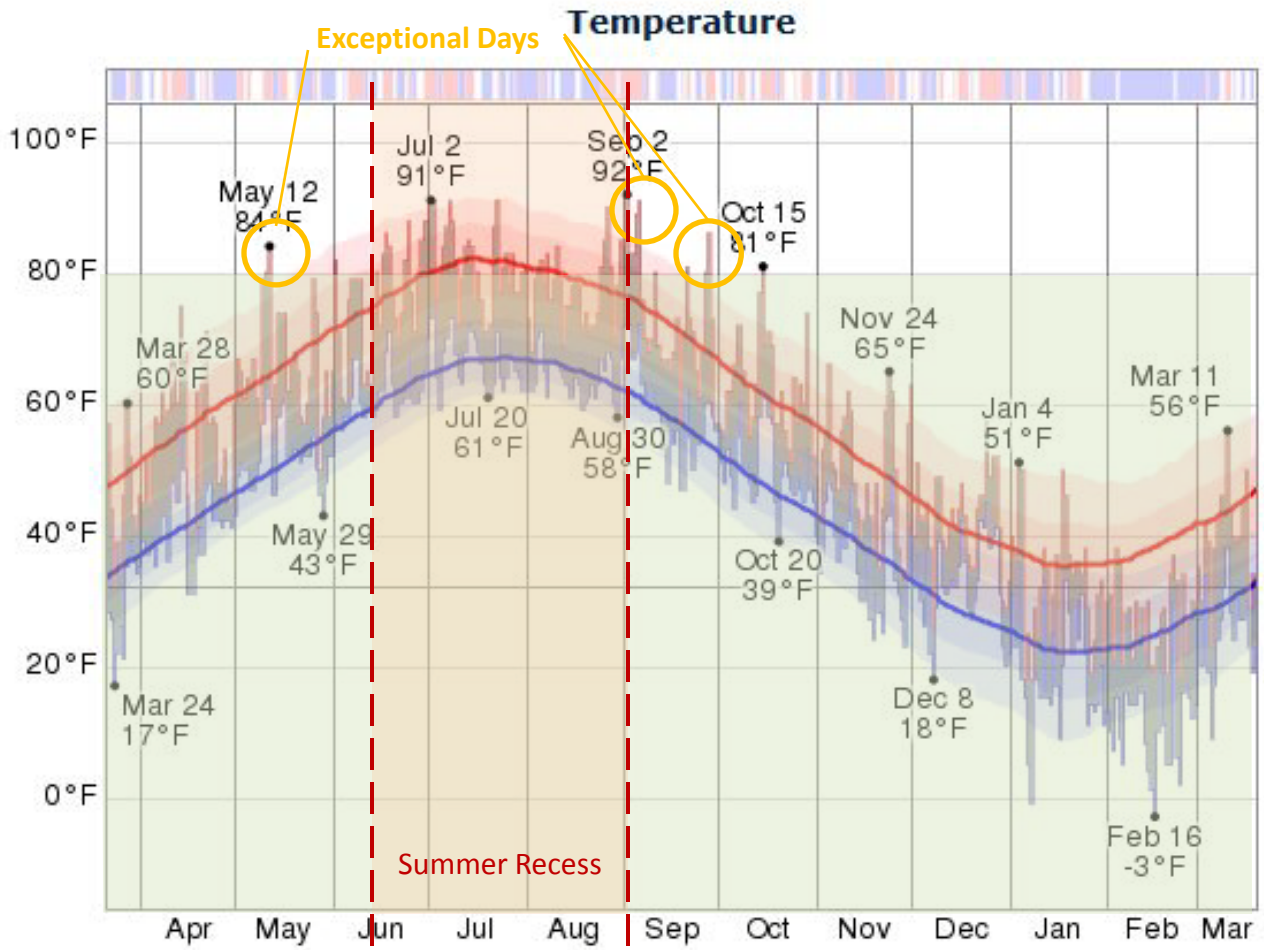


HARVARD STREET LEVEL

BUILDING USE VACATION/ SUMMER

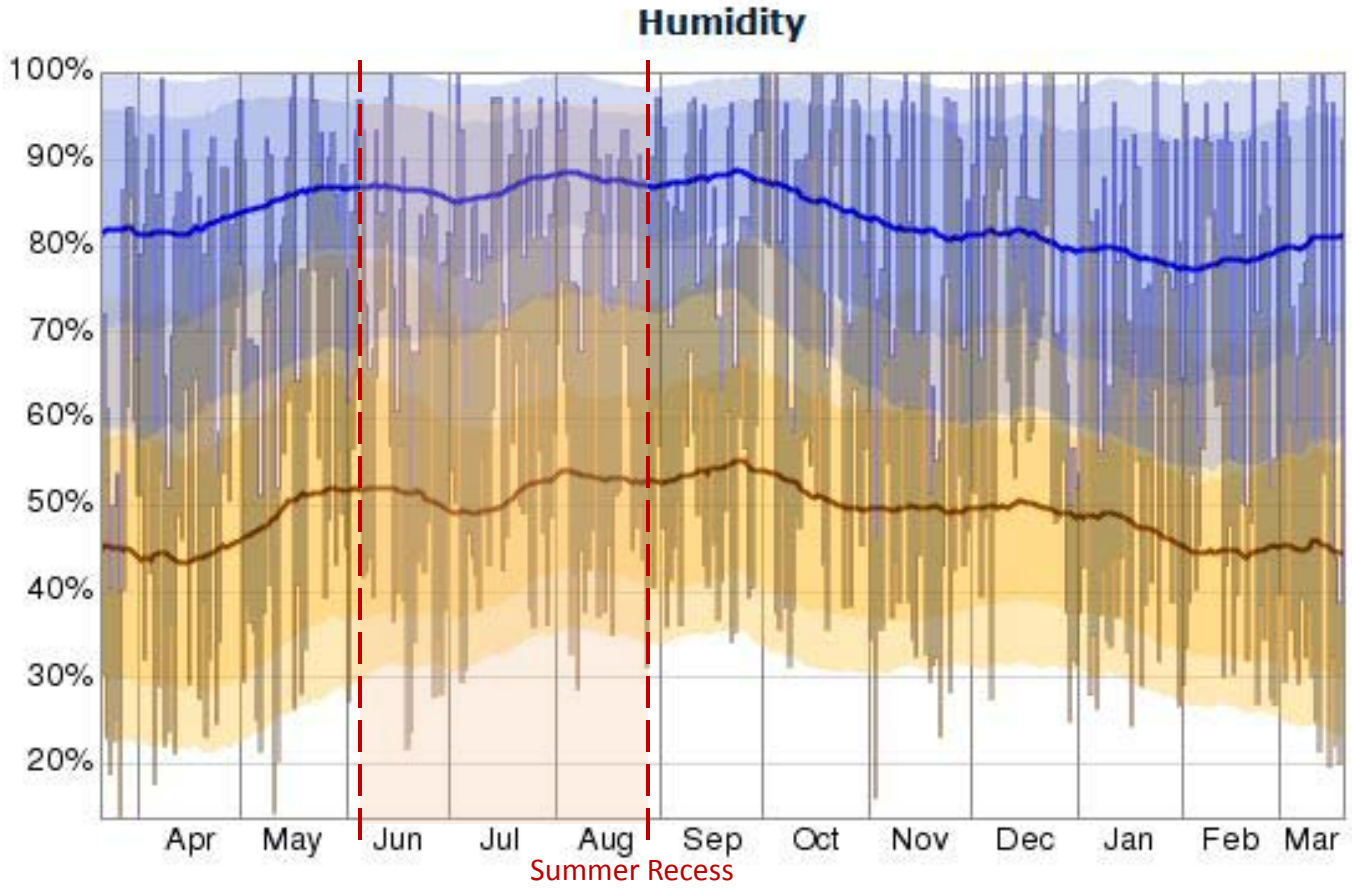


LOCATION: Brookline, MA



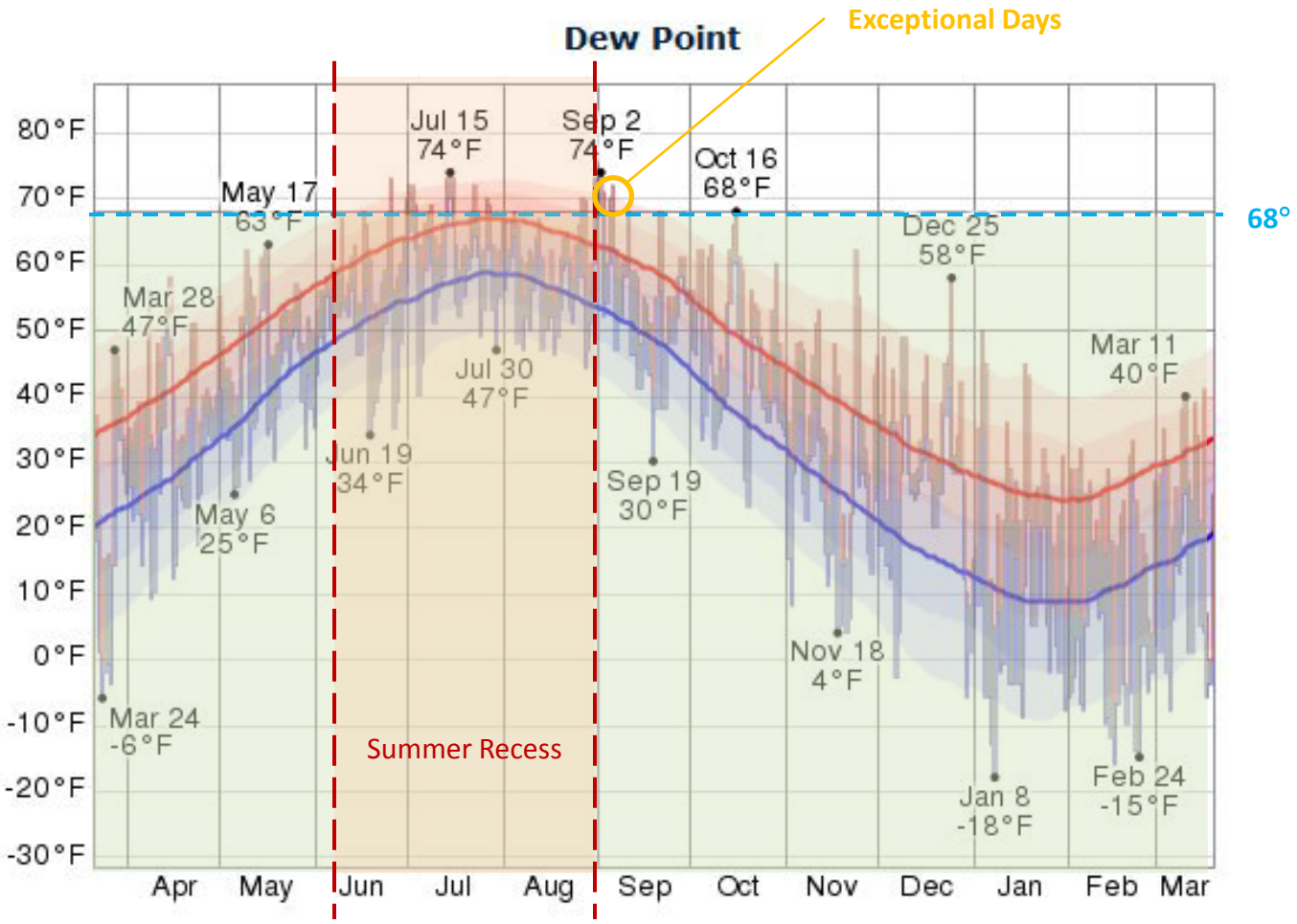
*The daily low (blue) and high (red) temperature during **the last 12 months** with the area between them shaded gray and superimposed over the corresponding averages (thick lines), and with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile). The bar at the top of the graph is red where both the daily high and low are above average, blue where they are both below average, and white otherwise.*

LOCATION: Brookline, MA



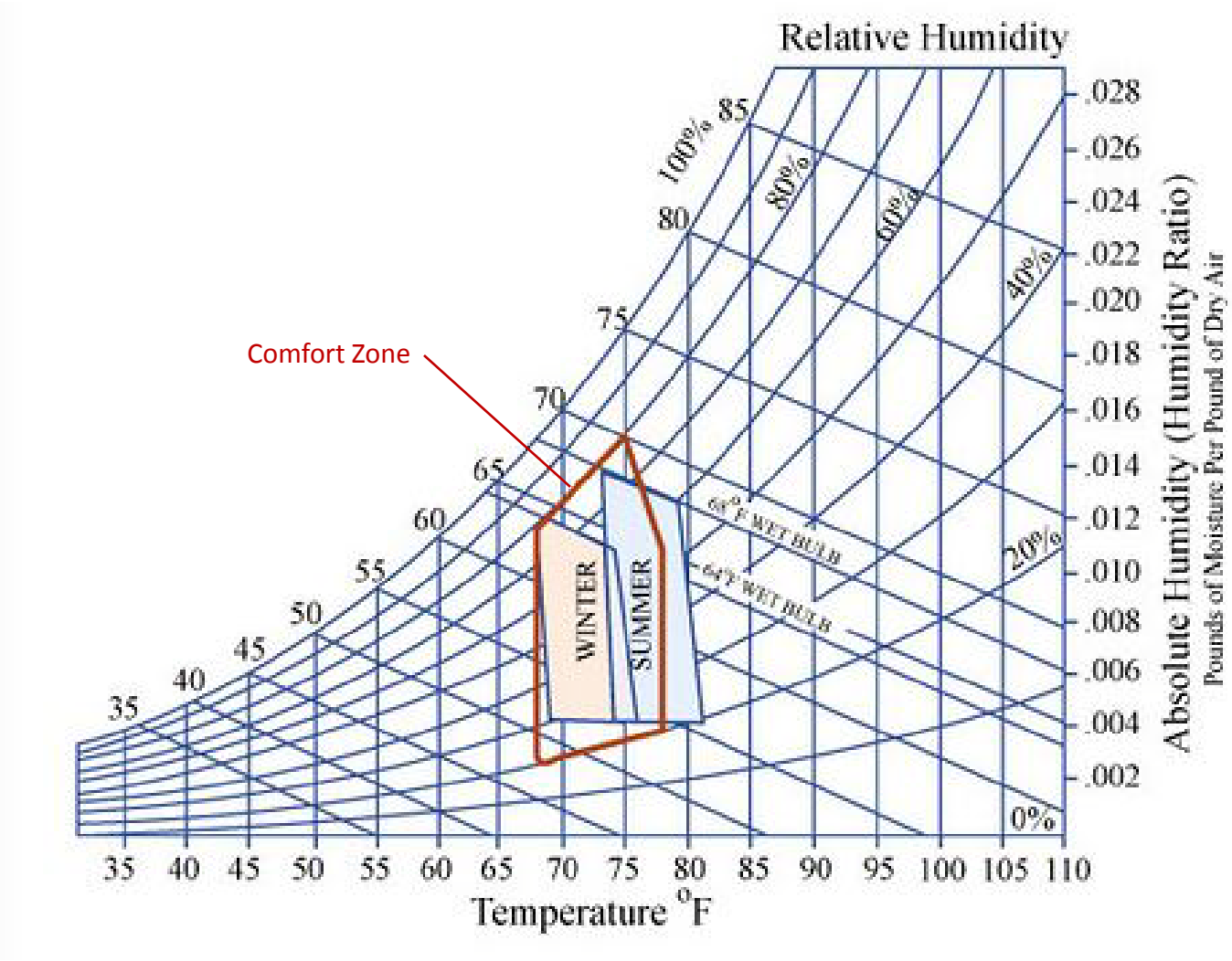
The daily low (brown) and high (blue) relative humidity during ***the last 12 months*** *with the area between them shaded gray and superimposed over the corresponding averages (thick lines), and with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile).*

LOCATION: Brookline, MA



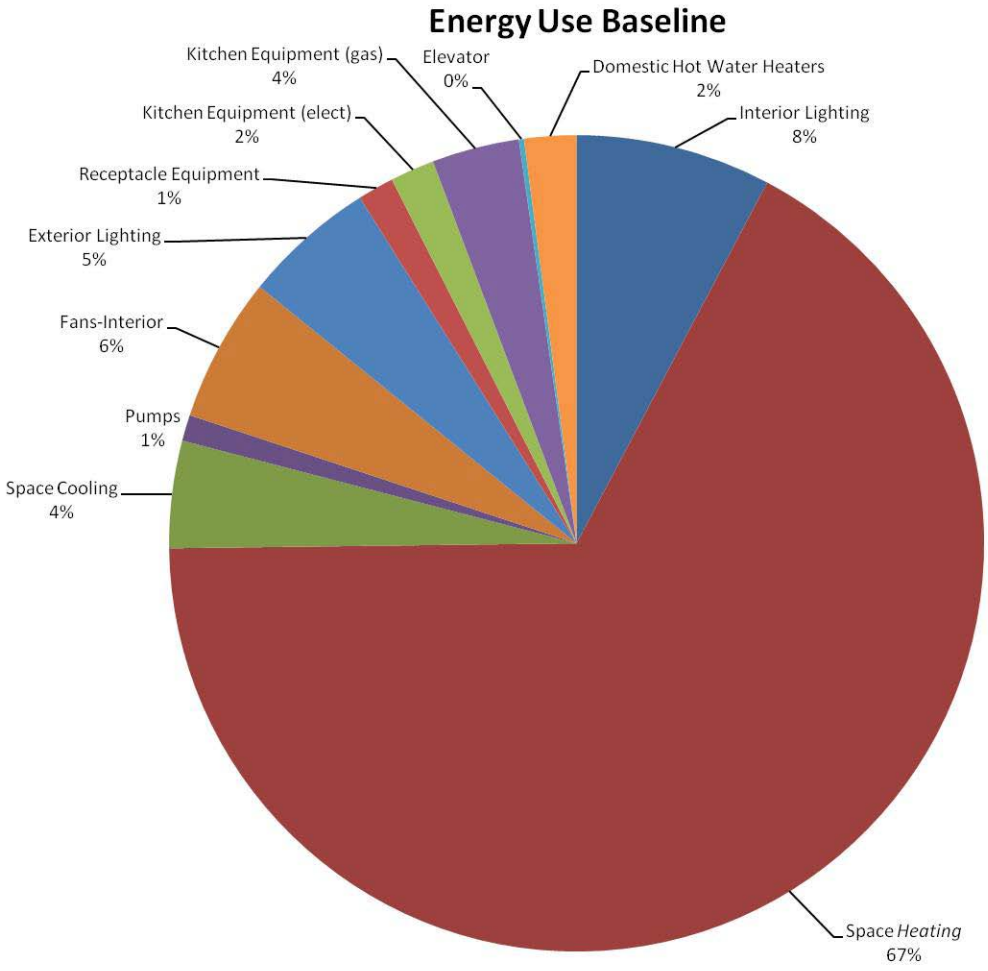
The daily low (blue) and high (red) dew point during the last 12 months with the area between them shaded gray and superimposed over the corresponding averages (thick lines), and with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile).

EXPECTATION FOR HUMAN COMFORT

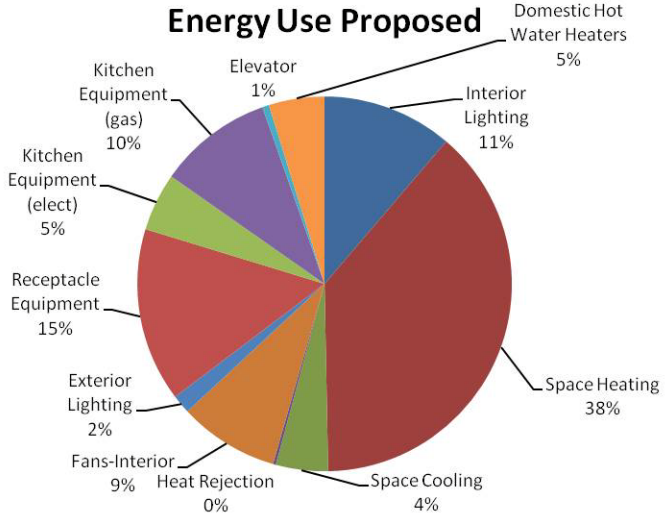


WHERE IS THE ENERGY USED?

(Example from Pell Elementary School in Newport, R.I.)



Total Energy Use: 10,437,407 kBTU



Total Energy Use: 3,655,633 kBTU

PAYBACK ANALYSIS

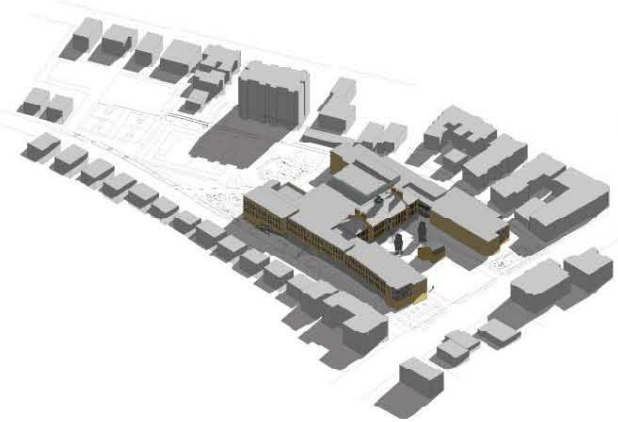
(Example from Pell Elementary School in Newport, R.I.)

Superior Energy Efficiency Measures for Newport Elementary School
(To Provide Energy Savings Greater Than 40% Better Than Code, Assuming Current Design is 30% Better Than Code)

Item #	Description of Energy Efficient Design	Capacity	Cost Add (Note 1)	Approximate Expected % Savings (Note 2)	Simple Payback (Years)	Remarks
1	Lighting	Change from 0.75 w/s.f. (Base Design) to 0.6 w/s.f. (Superior Efficiency)	$53,550	4.7%	8.9	There are rebates for LED lighting likely to reduce payback to 3 years
2	Photovoltaics	30 kW	$150,000	5.0%	24.8	Cost Estimate based on $5/watt
3	Photovoltaics (Superior Design)	60 kW	$270,000	11.0%	20.3	Cost Estimate based on $4.5/watt
4	Photovoltaics (Net Zero Design)	450 kW	$1,800,000	100.0%	14.9	Cost Estimate based on $4/watt, Net Zero Building Option (Note 3,4)
5	Geothermal (Partial Building)	Change from 40 ton chiller to 40 ton geothermal system	$174,514	13.0%	6.9	Serves Media Center and Administration Areas
6	Geothermal (Entire Building)	Increase from 40 ton to 120 ton geothermal system	$369,852	5.0%	61.3	-
7	Superior Wall	Wall Insulation R-32	$81,396	1.8%	37.4	Base Design: Wall Insulation R-24.5
8	Superior Roof	Roof Insulation R-40	$91,392	2.2%	34.4	Base Design: Roof Insulation R-30

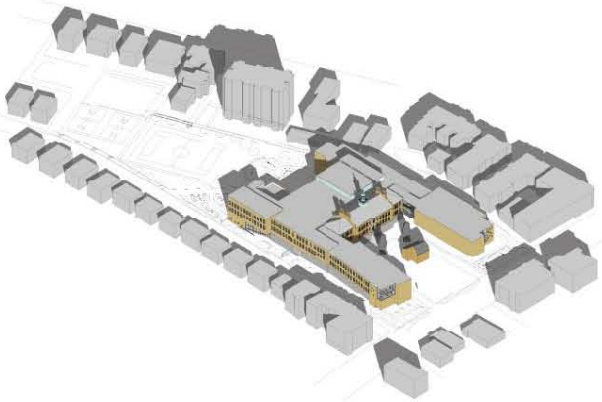
Note 1: Additional costs per PM&C cost estimate with the exception of Item #'s 2, 3, and 4 which were by Garcia Galuska DeSousa and are reflective of recent projects. All costs include a 19% general contractor mark-up.
Note 2: Approximate energy savings of each item are not necessarily additive. For example; an improved envelope will result in decreased cooling/heating loads which in turn would reduce the cooling/heating savings seen for a geothermal system.
Note 3: Requires entire building geothermal system is selected to provide a Net Zero Building Option.
Note 4: Payback does not include possible SREC reimbursment from state or federal government.

SOLAR STUDY

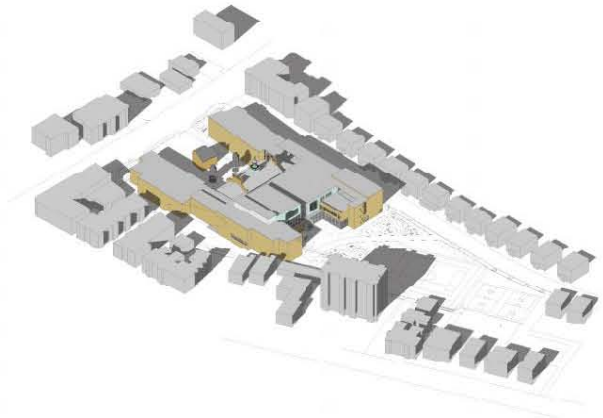


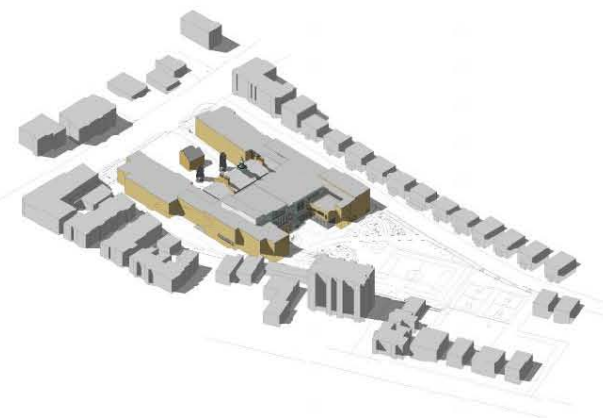
8:00AM

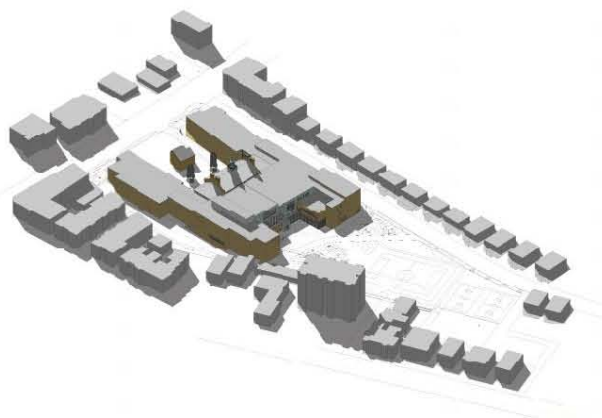
12:00PM



3:00PM



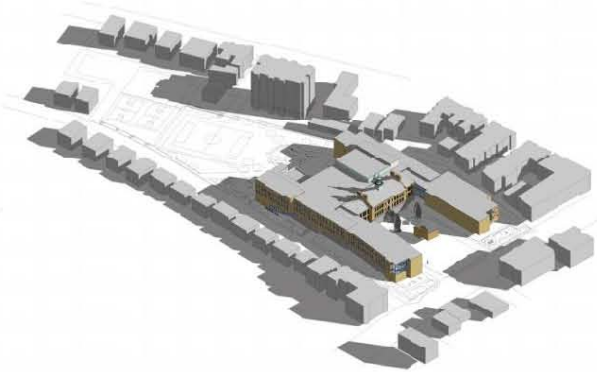




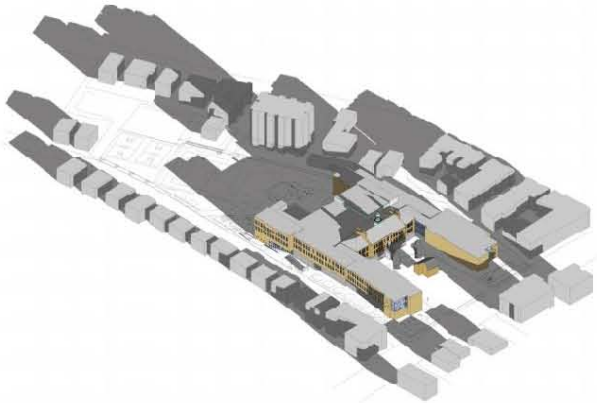
FALL / SPRING EQUINOX

SOLAR STUDY

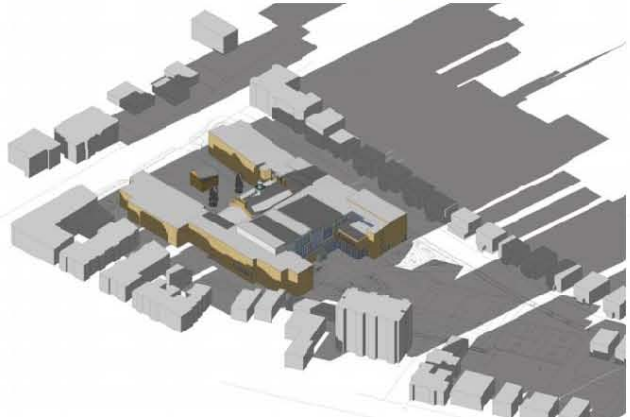
8:00AM

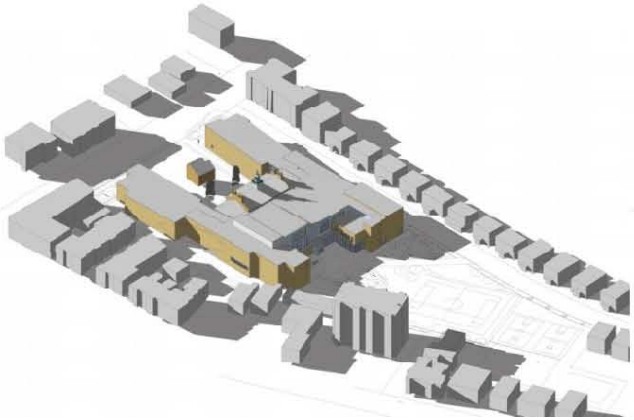


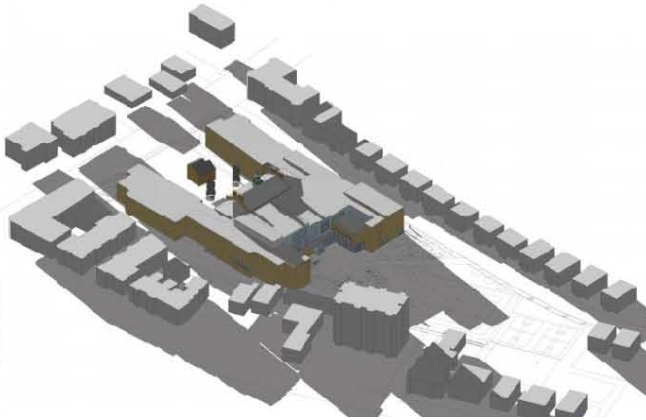
12:00PM



3:00PM







WINTER EQUINOX

HIGH PERFORMANCE GOALS:
INDOOR ENVIRONMENTAL QUALITY

9	5	2	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
Y			Prereq	Minimum Acoustic Performance	Required
1		1	Credit	Enhanced Indoor Air Quality Strategies	2
2	1		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
		1	Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
1	2		Credit	Daylight	3
1			Credit	Quality Views	1
	1		Credit	Acoustic Performance	1

HIGH PERFORMANCE GOALS:
WATER EFFICIENCY

4	3	5	Water Efficiency		12
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
2		5	Credit	Indoor Water Use Reduction	7
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

HIGH PERFORMANCE GOALS:
SUSTAINABLE SITES

2	7	3	Sustainable Sites		12
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	Environmental Site Assessment	Required
	1		Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space	1
	3		Credit	Rainwater Management	3
1	1		Credit	Heat Island Reduction	2
		1	Credit	Light Pollution Reduction	1
	1		Credit	Site Master Plan	1
1			Credit	Joint Use of Facilities	1

PROPOSED SITE PLAN

1 DROP-OFF AREA
2 BENCHES
3 URBAN ORCHARD
4 PLAY AREA
5 (5) VISITOR + (1) RESIDENT PARKING
6 DEVOTION HOUSE HERB GARDEN (NIC)
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OTHER GOALS

NEXT STEPS